



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,637	12/31/2003	Barrett E. Cole	H0005547-0760(1100.122910	9413
128	7590	01/27/2006	EXAMINER	
HONEYWELL INTERNATIONAL INC. 101 COLUMBIA ROAD P O BOX 2245 MORRISTOWN, NJ 07962-2245			MILLER, DANIEL H	
			ART UNIT	PAPER NUMBER
			1775	

DATE MAILED: 01/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/749,637	COLE ET AL.	
	Examiner	Art Unit	
	Daniel Miller	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 and 17-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 10-16 and 26-34 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>Jul 26, 04 (8/16/05)</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 10-16 and 26-34, drawn to a structure with catalytic island for nanotube growth, classified in class 428, subclass 408.
 - II. Claims 1-9, and 17-25, drawn to a method of making a catalytic island for nanotube growth, classified in class 427, subclass 29.1.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions Group I and Group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made using a materially different method. For instance, the HfN layer could be deposited as a vapor deposition layer already in molecular form as opposed to separately.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with John Schudy on 12/19/05 a provisional election was made with traverse to prosecute the invention of Group I, claims 10-16 and 26-34. Affirmation of this election must be made by applicant in replying to this Office

Art Unit: 1775

action. Claims 1-9 and 17-25 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claim 26 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not provide support for an insulating substrate with two subsequent layers or islands of any material. The specification only has support for an island made of a catalyst and a first layer comprising the material of claim 27.

Claim Rejections - 35 USC § 102

Art Unit: 1775

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 26-28, 30, and 33-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Son et al (U.S. 2004/01619129).

10. Regarding claim 26, Son teaches an insulating substrate with a first material (430 barrier layer) deposited on a substrate (401) and an island of second material (510 catalyst) formed on the first material (figure 8). Regarding claim 27, the first material can be titanium nitride (0041). Regarding claim 30, the second material is nickel, cobalt or iron (0042 and 0045). Regarding claim 33, the substrate can be silicon, quartz, glass or ceramic (0039). Regarding claim 34, the island (catalyst layer comprises carbon nanotubes extending from the island (figure 9 and 10 and 0048).

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claim 26 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al (U.S. 6,339,281B2).

12. Lee teaches an insulating substrate (1) with a first material (2) deposited on the substrate and an island of catalyst (second) material (9) formed on the first material

Art Unit: 1775

(figure 2H and column 4 Line 2-10, 28-35). Regarding claim 34, an array of carbon nanotubes is grown from the catalytic material (#10 figure 2H).

13. Claims 26, 27, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsu (U.S. 6,890,233 B2).

14. Hsu teaches an insulating substrate (column 6 line 20-30) with a transition metal nitride conductive layer (column 7 line 45-55). Then an adhesion second layer is added. Regarding claim 27, the first layer can be HfN or TiN (column 7 line 48-55). Regarding claim 34, a carbon nanotube array is grown on the second layer (figure 28).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 10-16, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Son et al (U.S. 2004/01619129) in view of Shen et al U.S. 6,143,474 further in view of Zenke et al (U.S. 5,187,557).

17. Regarding claim 10, Son, discussed above, further discloses a resistor layer (typically an oxide layer, see Shen et al U.S. 6,143,474 for description of oxidized

Art Unit: 1775

substrate figure 2) followed by a titanium nitride layer (barrier layer claim 1) and then covered with a passivation layer (# 460 figure 8). However, the reference is silent as to the presence of HfN and the composition of the resistor layer.

18. Zenke discloses that titanium nitride and hafnium nitride are routinely interchangeable in semiconductor applications (see claim 4 Zenke).

19. Therefore, as it is taught by Zenke that a HfN and TiN layers are interchangeable, it would be obvious to substitute HfN for TiN since the two are interchangeable within the technology. However, Zenke is silent as to the presence of a resistor or oxide layer.

20. It would have further been obvious to use a conductive oxide layer because since Shen teaches that a resistor layer is an oxide layer (see Shen et al U.S. 6,143,474 for description of oxidized substrate figure 2).

21. Son further discloses a hole through the passivation layer to the TiN layer where the catalytic island is formed (510 of figure 8-10). The catalytic layer is in contact with the TiN layer. Regarding claims 11-16, carbon nanotubes are grown on the catalytic island as discussed above using a plasma deposition and etching process with temperatures ranging from 500 C to 900 C. However the reference teaches TiN and is silent as to a HfN layer. Claims 11, 12, 15, 16 are considered intended use only and do not structurally define over the prior art. A carbon nanotube is not positively recited in the claims. Regarding claims 28-29, it would be obvious to make the material stoichiometric or non-stoichiometric absent a showing of criticality with respect to this feature.

Art Unit: 1775

22.

23. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Son et al in view of Gossen (U.S. 5,710,656) or Liu et al (U.S. 6,268,615B1).

24. Son, discussed above, discloses an electron-emitting device used to display an image using visible light (see 0003) but is silent as to the use of ITO as a first layer.

25. Goossen and Liu both teach a first layer having ITO. The layers are used because of their applicability in optical applications such as photodetectors (see Liu abstract). The ITO coating having a unique reaction to light (see Liu et al claims 8 and 9).

26. As it is taught by Goossen and Liu that it is commonly known to use a ITO layer for optical applications such as photodetectors it would have been obvious to use an ITO oxide first layer if using the device for similar optical applications like Goossen and Liu because they have a unitary purpose.

27. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Son et al (U.S. 2004/01619129) in view of Shen et al U.S. 6,143,474.

28. Son, discussed above, is silent as to the first material being a protective oxide.

29. Shen teaches a resistor layer is typically an oxide layer; see Shen et al U.S. 6,143,474 for description of oxidized substrate figure 2.

Art Unit: 1775

30. As it is taught by Shen that it is known to form a resistor layer as a conductive oxide, it would have been obvious to use a conductive oxide since it is typical and common in the art.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Miller whose telephone number is (571) 272-1534. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Miller



JENNIFER MCNEIL
PRIMARY EXAMINER
11/23/06